
Computers & Structures

An
International
Journal

List of Contents and Author Index

Volume 63, 1997



PERGAMON

Computers & Structures

An
International
Journal

Editors

K. J. Bathe
M.I.T., Cambridge
MA, USA

B. H. V. Topping
Heriot-Watt University
Edinburgh, UK

Editorial Advisory Board

N. Akkas
Middle East Technical
University, Ankara, Turkey

S. N. Atluri
Georgia Institute of
Technology, Atlanta, USA

I. Babuska
University of Texas, Austin,
USA

J. L. Batoz
Universite de Technologie
Compiegne, Compiegne,
France

T. Belytschko
Northwestern University,
Evanston, USA

N. Bicanic
University of Glasgow,
Glasgow, UK

R. de Borst
Delft University of Technology,
Delft, The Netherlands

F. Brezzi
Palazzo del Universita, Pavia,
Italy

M. Bucalem
Escola Politecnica da
Universidade, Sao Paulo, Brazil

J. W. Bull
University of Newcastle upon
Tyne, Newcastle upon Tyne,
UK

Gangdong Cheng
Dalian University of
Technology, Dalian, China

Y. K. Cheung
University of Hong Kong, Hong
Kong

C. Cingini
Universita di Pavia, Pavia, Italy

M. Crisfield
Imperial College, London, UK

C. S. Desai
University of Arizona, Arizona,
USA

E. N. Dvorkin
Fundacion para el Desarrollo
Tecnologico, Buenos Aires,
Argentina

C. A. Felippa
University of Colorado,
Boulder, USA

D. Frangopol
University of Colorado,
Boulder, USA

W. G. Habashi
Concordia University, Montreal,
Canada

P. Hajela
Rensselaer Polytechnic
Institute, Troy, USA

E. Hinton
University of Swansea,
Swansea, UK

T. J. R. Hughes
Stanford University, Stanford,
USA

E. Kausel
Massachusetts Institute of
Technology, Cambridge, USA

A. Kaveh
Technical University of Vienna,
Wien, Austria

M. Kawahara
Chuo University, Tokyo, Japan

M. Kleiber
Polish Academy of Sciences,
Warsaw, Poland

W. K. Liu
Northwestern University,
Evanston, USA

H. A. Mang
Technical University of Vienna,
Vienna, Austria

J. L. Meek
University of Queensland,
Queensland, Australia

U. Meissner
Technische Hochschule
Darmstadt, Darmstadt,
Germany

C. A. Mota Soares
The Technical University of
Lisbon, Lisboa, Portugal

Z. Mroz
Polish Academy of Sciences,
Warsaw, Poland

A. K. Noor
University of Virginia,
Hampton, USA

J. T. Oden
The University of Texas, Austin,
USA

R. Ohayon
CNAM, Paris, France

E. Onate
Universitat Politecnica de
Catalunya, Barcelona, Spain

M. Ortiz
CALTECH, Pasadena, USA

D. R. J. Owen
University of Wales, Swansea,
UK

M. Papadrakakis
National Technical University,
Athens, Greece

M. N. Pavlovic
Imperial College of Science and
Technology, London, UK

E. Ramm
Universitat Stuttgart, Stuttgart,
Germany

F. Rammerstorfer
Vienna University of
Technology, Vienna, Austria

J. N. Reddy
Texas A&M University, Texas,
USA

E. Riks
Technical University of Delft,
Delft, The Netherlands

B. Schrefler
Universita di Padova, Padova,
Italy

M. S. Shephard
Rensselaer Polytechnic
Institute, Troy, USA

H. Stein
University of Hannover,
Hannover, Germany

P. Le Tallec
INRIA and University Paris
Dauphine, France

A. B. Templeman
University of Liverpool,
Liverpool, UK

G. Thierauf
University of Essen, Essen,
Germany

N. P. Weatherill
University College of Swansea,
Swansea, UK

N.-E. Wiberg
Chalmers University of
Technology, Goteborg, Sweden

P. Wriggers
Technische Hochschule
Darmstadt, Darmstadt,
Germany

W. Wunderlich
Technische Universität
München, München, Germany

G. Yagawa
University of Tokyo, Tokyo,
Japan

O. C. Zienkiewicz
University of Wales, Swansea,
UK

Production Editor: Susan Li, e-mail: s.li@elsevier.co.uk

Publishing and Advertising Offices: Elsevier Science Regional Sales Office, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A., or Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K.

Published semi-monthly (four volumes 1997)

Annual subscription rates (1997)

Annual Institutional Subscription Rates 1997: Europe, The CIS and Japan, 5564.00 Dutch Guilders. All other countries, US\$3434.00. Associated Personal Subscription rates are available on request for those whose institutions are library subscribers. Dutch Guilders prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice. For orders, claims and product enquiries (no manuscript enquiries), please contact the Customer Support Department at the Regional Sales Office nearest to you: **The Americas:** Elsevier Science, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, USA [Tel: (1) 212-633-3730. Toll Free number for North American customers: 1-888-4ES-INFO. Fax: (1) 212-633-3680. E-mail: usinfo-f@elsevier.com]. **Japan:** Elsevier Science Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan [Tel: (81) 3 5561-5033. Fax: (81) 3 5561-5047. E-mail: kyf04035@niftyserve.or.jp]. **Asia Pacific (excluding Japan):** Elsevier Science (Singapore) Pte Ltd, No. 1 Temasek Avenue, 17-01 Millenia Tower, Singapore 039192. [Tel: (65) 434-3727. Fax: (65) 337-2230. E-mail: asiainfo@elsevier.com.sg]. **Rest of the World:** Elsevier Science Customer Service Department, PO Box 211, 1001 AE Amsterdam, The Netherlands. [Tel: (31) 20-485-3757. Fax: (31) 20-485-3432. E-mail: nlinfo-f@elsevier.nl].

PERIODICALS POSTAGE PAID AT RAHWAY, NEW JERSEY AND ADDITIONAL ENTRY POINTS. *Computers & Structures* (ISSN 0045-7949) is published semi-monthly, two issues per month January to December in four volumes, by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is \$3434. *Computers & Structures* is distributed by Mercury Airfreight International Ltd, 10 Camptown Road, Irvington, NJ 07111-1105. POSTMASTER: Please send address corrections to *Computers & Structures*, c/o Elsevier Science Regional Sales Office, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A.

Copyright © 1997 Elsevier Science Ltd. All rights reserved.

LIST OF CONTENTS

NUMBER 1

S. K. Nath, S. K. Singh, A. Pani and S. Sengupta	1	Forward modelling in cross-hole seismic tomography using reciprocity
J. Alfaiate, E. B. Pires and J. A. C. Martins	17	A finite element analysis of non-prescribed crack propagation in concrete
L. A. Louca and J. E. Harding	27	Non-linear analysis of imperfect plates under transient lateral pressure loading
R. Artan	39	Unsymmetrical elastic stamp on a nonlocal elastic half-plane
K. Liu	51	Application of SVD in optimization of structural modal test
In-Won Lee, Man-Cheol Kim and A. R. Robinson	61	Determination of the natural frequencies and mode shapes for large structures by accelerated Newton-Raphson method
H. M. Kim, D. A. VanHorn and T. S. West	69	Dynamic loads analysis of photovoltaic arrays for the space station
Rong-Fong Fung	79	Dynamic responses of the flexible connecting rod of a slider-crank mechanism with time-dependent boundary effect
Rong-Fong Fung, Chi-Chuan Hwang, Chien-Sen Huang and Weng-Pin Chen	91	Inverse dynamics of a toggle mechanism
J. R. Banerjee	101	Dynamic stiffness formulation for structural elements: a general approach
W. Jiang, G. Bao and J. C. Roberts	105	Finite element modeling of stiffened and unstiffened orthotropic plates
M. B. Krakovski	119	Optimization of RC structures using design of experiments
Y. F. Zhao, T. N. Wong, S. T. Tan and W. J. Chen	133	A model for simulating flexible surfaces of cloth objects
Young-Shin Lee and Ki-Du Lee	149	On the dynamic response of laminated circular cylindrical shells under impulse loads
N. C. Hamouche, Z. U. A. Warsi and J. C. McWhorter III	159	A spectral solution for the bending of arbitrarily shaped plates

**W. P. Prema Kumar
and R. Palaninathan**

- 173 Finite element analysis of laminated shells with exact through-thickness integration

Letter to the Editor

R. H. MacNeal

- 185 Comment on "Barlow points and Gauss points and the aliasing and best fit paradigms", by G. Prathap

NUMBER 2

**Cho-Chung Liang,
Ching-Yu Hsu
and Huei-Rong Tsai**

- 187 Minimum weight design of submersible pressure hull under hydrostatic pressure

R. C. Batra and X. Q. Liang

- 203 The vibration of a rectangular laminated elastic plate with embedded piezoelectric sensors and actuators

I. Takewaki

- 217 Elastic frame redesign via a performance-based incremental inverse problem

J. Jirousek and A. P. Zieliński

- 225 Survey of Trefftz-type element formulations

**H. R. Busby and
D. M. Trujillo**

- 243 Optimal regularization of an inverse dynamics problem

**S. Lakshmanan, B. K. Soni
and K. Balasubramaniam**

- 249 r-Adaptation in finite element modelling of elastic solids

**J. A. Masad
and B. Balachandran**

- 259 Computational methods for differential eigensystems

W. M. Hasan and E. Viola

- 267 Use of the singular value decomposition method to detect ill-conditioning of structural identification problems

J. Atkočiūnas

- 277 Compatibility equations of strains for degenerate shakedown problems

**P. K. Subrahmanyam and
P. Seshu**

- 283 Dynamics of a flexible five bar manipulator

W. Han and M. Petyt

- 295 Geometrically nonlinear vibration analysis of thin, rectangular plates using the hierarchical finite element method—I: the fundamental mode of isotropic plates

W. Han and M. Petyt

- 309 Geometrically nonlinear vibration analysis of thin, rectangular plates using the hierarchical finite element method—II: 1st mode of laminated plates and higher modes of isotropic and laminated plates

A. M. Tarabia and R. Y. Itani

- 319 Static and dynamic modeling of light-frame wood buildings

- Hui-Shen Shen** 335 Post-buckling analysis of imperfect stiffened laminated cylindrical shells under combined external pressure and axial compression
- P. Gagnon, C. Gosselin and L. Cloutier** 349 A finite strip element for the analysis of variable thickness rectangular thick plates

NUMBER 3

- A. E. Anuta Jr** 363 The force equations in relativity
- A. E. Anuta Jr** 367 The correlation between the modal and force equations
- Dong-Min Lee and In Lee** 371 Vibration behaviors of thermally postbuckled anisotropic plates using first-order shear deformable plate theory
- J. Petrolito and K. A. Legge** 379 Benchmarks for frames subject to follower loads
- M. T. Manzari and M. A. Nour** 385 On implicit integration of bounding surface plasticity models
- C. Kalliontzis, E. Andrianis, K. Spyropoulos and S. Doikas** 397 Nonlinear static stress analysis of submarine high pressure pipelines
- L. N. B. Gummadi and A. N. Palazotto** 413 Nonlinear finite element analysis of beams and arches using parallel processors
- A. Carpinteri and Guoping Yang** 429 Size effects in brittle specimen with microcrack interaction
- H. Alaylioglu and Ayse Alaylioglu** 439 Dynamic structural assessment of a highway bridge via hybrid FE model and *in situ* testing
- W. Karunasena, C. M. Wang, S. Kitipornchai and Y. Xiang** 455 Exact solutions for axisymmetric bending of continuous annular plates
- Dewu Huang, D. Redekop and Bo Xu** 465 Natural frequencies and mode shapes of curved pipes
- A. Selman, E. Hinton and N. Bićanić** 475 Adaptive mesh refinement for localised phenomena
- G. Xu and S. Pietruszczak** 497 Numerical analysis of concrete fracture based on a homogenization technique
- R. M. Delgado and S. M. dos Santos R. C.** 511 Modelling of railway bridge-vehicle interaction on high speed tracks
- S. Wang** 525 Free vibration analysis of skew fibre-reinforced composite laminates based on first-order shear deformation plate theory

- | | | |
|--|------------|---|
| D. Maruthi Rao and
P. K. Sinha | 539 | Finite element coupled thermostructural analysis of composite beams |
| R. Karakuzu, A. Özel and
O. Sayman | 551 | Elastic-plastic finite element analysis of metal matrix plates with edge notches |
| C. J. Shih | 559 | Fuzzy and improved penalty approaches for multi-objective mixed-discrete optimization in structural systems |
| H. S. Yu and S. W. Sloan | 567 | Finite element limit analysis of reinforced soils |
| E. B. Marin and
D. L. McDowell | 579 | A semi-implicit integration scheme for rate-dependent and rate-independent plasticity |
| Bo Liang, Y. Tamura and
S. Suganuma | 601 | Simulation of wind-induced lateral-torsional motion of tall buildings |
| Jeong-Oun Kim and
Young-Doo Kwon | 607 | On the modification of Gauss sampling points of 6-node and 16-node isoparametric finite elements |
| Cheng Huang,
Zhong-Sheng Liu and
Su-Huan Chen | 625 | An accurate modal method for computing response to periodic excitation |
| Ashok Kumar Gosh and
M. Ramesh Kumar | 633 | Dynamic analysis of supporting structure of mobile antenna |
| <i>Technical Note</i> | | |
| M. E. Bechly and
P. D. Clausen | 639 | Structural design of a composite wind turbine blade using finite element analysis |

NUMBER 4

COMPUTING IN CIVIL AND STRUCTURAL ENGINEERING

- | | |
|---|------------|
| B. H. V. Topping and A. I. Khan: Preface | v |
| H. Fuyama, K. H. Law and H. Krawinkler: An interactive computer assisted system for conceptual structural design of steel buildings | 647 |
| B. Raphael and B. Kumar: Object oriented representation of design cases | 663 |
| C. A. Symakezis and G. K. Mikroudis: ERDES—an expert system for the aseismic design of buildings | 669 |
| D. Anderson, E. L. Hines, S. J. Arthur and E. L. Eiap: Application of artificial neural networks to the prediction of minor axis steel connections | 685 |
| B. H. V. Topping, A. I. Khan and A. Bahreininejad: Parallel training of neural networks for finite element mesh decomposition | 693 |
| A. Kaveh: Topological transformations applied to structural mechanics | 709 |
| A. Kaveh and I. Ghaderi: Conditioning of structural stiffness matrices | 719 |
| A. Kaveh and A. Mokhtar-Zadeh: A comparative study of combinatorial and algebraic force methods | 727 |
| M. B. Fuchs: Unimodal formulation of the analysis and design problems for framed structures | 739 |
| R. P. West and M. N. Pavlović: A fast iterative algorithm for eigenvalue determination | 749 |

- N. Tahan, M. N. Pavlović and M. D. Kotsovos: Shear-lag revisited: the use of single Fourier series for determining the effective breadth in plated structures 759
- G. J. Turvey and H. Drinali: Nonlinear first yield analysis of circular plates subjected to combined uniform pressure and edge compression 769
- G. J. Turvey and M. Salehi: Circular plates with one diametral stiffener—an elastic large deflection analysis 775
- R. Levy and V. Sokolinsky: Optimal design of plates for shear buckling 785
- M. P. Saka: Optimum design of steel frames with tapered members 797
- Th. Bulenda: Arnoldi (IOM)-Newton algorithm for pathfollowing in nonlinear statics 813
- N. Akkas and K. Tuncay: Dynamics of submerged shells of arbitrary geometry using improved transmitting boundaries 827
- M. N. Pavlović, S. Arnaout and D. Hitchings: Finite element modelling of sewer linings 837
- E. A. Dickin and G. J. W. King: Numerical modelling of the load-displacement behaviour of anchor walls 849

NUMBER 5

- S. T. Dennis 859 A Galerkin solution to geometrically nonlinear laminated shallow shell equations
- J. L. O'Daniel and T. Krauthammer 875 Assessment of numerical simulation capabilities for medium-structure interaction systems under explosive loads
- A. Źochowski 889 Representation of infinite domains in FEM computations
- J. Fish and R. Guttal 899 On the assumed strain formulation with selective polynomial order enrichment for *p*-version shells
- H. Alaylioglu and Ayse Alaylioglu 915 A practicable and highly accurate flat shell hybrid element for engineering applications on a PC
- V. E. Bulgakov 927 The use of the multi-level iterative aggregation method in 3-D finite element analysis of solid, truss, frame and shell structures
- W. Hartono 939 Elastic nonlinear behavior of truss system under follower and non-follower forces
- S. H. Lo 951 Optimization of tetrahedral meshes based on element shape measures
- Wenhua Ling and H. K. Stolarski 963 A contact algorithm for problems involving quadrilateral approximation of surfaces
- Chen Jin and F. Kosel 977 Dynamic response with respect to base movement of spring frame supported cantilever simple beam with concentrated mass
- W. Zhai and Z. Cai 987 Dynamic interaction between a lumped mass vehicle and a discretely supported continuous rail track

- Zhu Jufen and Chen Wanji** 999 Geometric nonlinear analysis by using refined triangular thin plate element and free form membrane locking
- G. Urriolagoitia-Calderon and L. H. Hernandez Gomez** 1007 Evaluation of crack propagation stability with the Williams stress function—II. Numerical analysis
- Compendium*
- J. Bento, B. Feijó and D. L. Smith** 1015 Engineering design knowledge representation based on logic and objects
- Technical Note*
- R. Takagi, M. Maeda, S. J. Duan and K. Nakagawa** 1033 A proposal for optimum structural design with the largest buckling load

NUMBER 6

- T. M. Cameron, L. Jordan and M. E. M. El-Sayed** 1037 Sensitivity of structural joint stiffnesses with respect to beam properties: a hybrid approach
- M. Isreb** 1043 Integrated life synthesis for boiler sootblowers in fossil power plants
- Ning Hu** 1053 A solution method for dynamic contact problems
- V. K. Yegupov, K. V. Yegupov, V. I. Starodub, P. P. Mazur and A. V. Kojrjitskiy** 1065 Simulation and automation of calculations of buildings (structures) on seismic effects
- A. E. Anuta, Jr** 1085 The transformation of the modal equations into the force equations
- G. P. Cherepanov and L. Martinez** 1095 A computerized model for thermal stresses in thin films
- G. Cristea** 1101 Fuzzy dynamic analysis of single degree of freedom nonlinear systems
- T. Krauthammer and R. K. Otani** 1113 Mesh, gravity and load effects on finite element simulations of blast loaded reinforced concrete structures
- A. A. Rogovoy** 1121 The stress recovery procedure for the finite element method
- Kwang-Won Lee and Gyung-Jin Park** 1139 Accuracy test of sensitivity analysis in the semi-analytic method with respect to configuration variables
- A. S. Gendy, A. F. Saleeb and S. N. Mikhail** 1149 Free vibrations and stability analysis of laminated composite plates and shells with hybrid/mixed formulation

- | | | |
|---|-------------|--|
| A. Michalopoulos,
G. E. Stavroulakis,
E. C. Zacharenakis and
P. D. Panagiotopoulos | 1165 | A prestressed tendon based passive control system for bridges |
| Hui-Shen Shen and
F. W. Williams | 1177 | Biaxial buckling and post-buckling of composite laminated plates on two-parameter elastic foundations |
| Hui-Shen Shen | 1187 | Thermal post-buckling analysis of imperfect shear-deformable plates on two-parameter elastic foundations |
| E. Bohnsack | 1195 | Continuous field approximation of experimentally given data by finite elements |
| R. J. Yang | 1205 | Multidiscipline topology optimization |
| K. N. Saha, R. C. Kar and
P. K. Datta | 1213 | Dynamic stability of a rectangular plate on non-homogeneous Winkler foundation |
| S. de Souza Lima and
H. Lima Soriano | 1223 | A method for graphic stress representation |
| J. Agarwal, D. I. Blockley
and N. J. Woodman | 1229 | Structural dynamic analysis on a connection machine |
| N. Harty and M. Danaher | 1243 | Evaluating preliminary structural designs in an expert system |

i List of contents and author index for Volume 63, 1997